Fishery Management & the Best Scientific Information Available (BSIA)

National Standard 2:

"Conservation and management measures shall be based upon the best scientific information available."

NOAA FISHERIES
NATIONAL MARINE FISHERIES SERVICE

Importance of National Standard 2

- affirms the role of science as the basis for management decision-making
- has resulted in a set of procedures and guidance for selecting "best" from a number of potential science alternatives (procedures differ regionally)
- stipulates that the lack of perfect science will not be used to delay implementation of required measures, when indicated by the preponderance of available information
- implies commitment to improving science used in decision-making

Some Issues in Application of NS-2

- Procedures for assuring the science is the "best"
- Management approaches considering scientific uncertainty (e.g., precautionary management, adaptive management)
- Assuring adequate scientific review of all science aspects (e.g., stock assessment, social science/economic information, management options analyses)
- Standards for best available science: statutory language or guidelines?

The Dilemmas of Decision Makers

- Is the science good enough to justify management actions? (balancing uncertainty, need for action, and short- and long - term consequences – i.e., no action has consequences)

- Traditional approach to management decisions is to set a low probability of incorrectly taking actions when none are needed (low probability of making a "Type I" error)

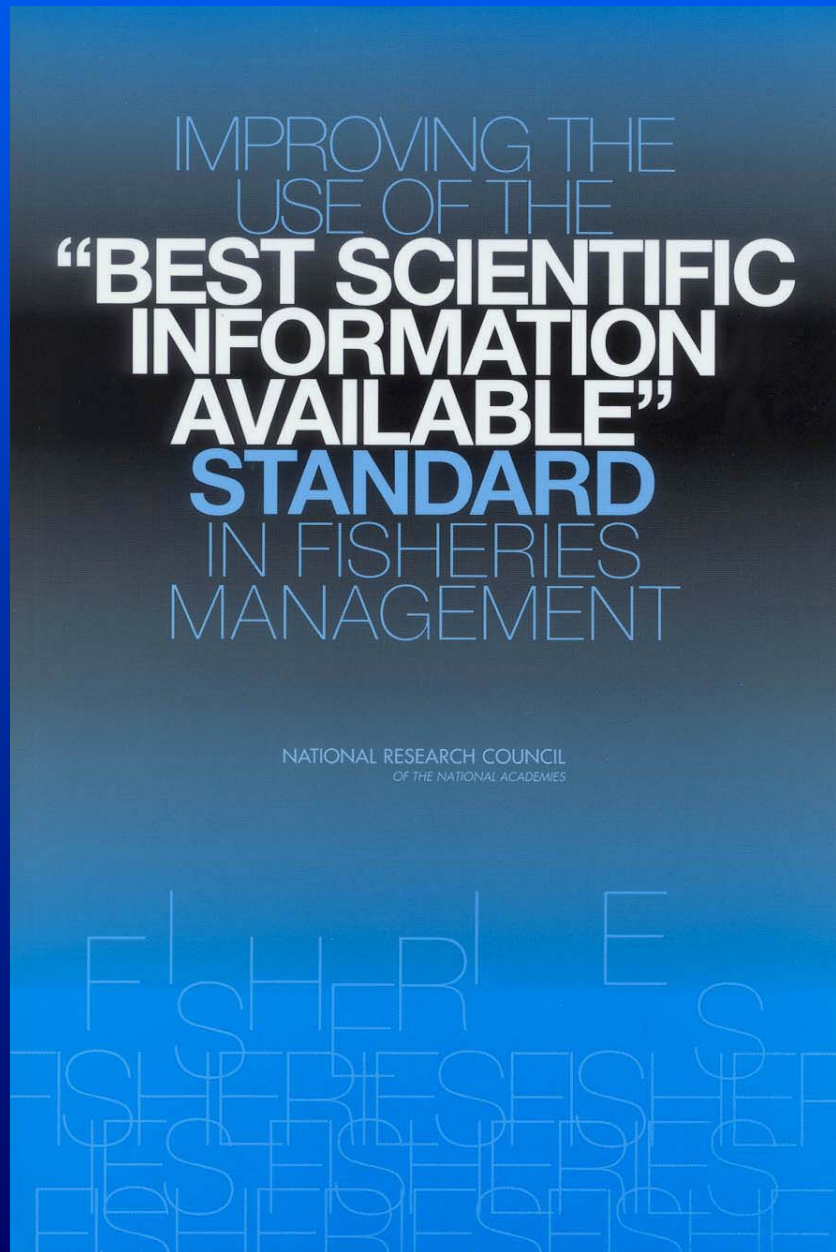
- Shift in recent years to minimizing the chance of not taking action when Actions are required ("Type II" error)

Also called "shifting the burden of proof" in precautionary management –

NS-1 guidelines: set targets farther from limits when more uncertain

National Research Council Study (NRC 2004)

- How should adherence to NS-2 be measured?
- How and when should it be employed?
- Should NS-2 be employed to exclude inadequate data or should data be ranked and applied in relation to relevance & rigor?
- NRC had Workshop & several studies undertaken (CORE WG)
- legislation or guidelines? - NRC study favors guidelines approach



Proposed NRC Guidelines for Production and Use of BSIA in FMPs

- Relevance
- Inclusiveness
- Objectivity
- Transparency & Openness
- Timeliness
- Peer Review

Peer Review of Science Under Magnuson-Stevens

All regions have processes to provide two-level peer review

- ✓ SE = SEDAR
- ✓ NW = STAR
- ✓ NE = SAW/SARC (domestic), TRAC (USA/Canada)
- ✓ AK = SSC, bilateral with Canada for some stocks
- ✓ SW = STAR, others
- ✓ Pacific Islands = SSC and external panels
- ✓ Also International = ICCAT, ICES, IATTC, etc.

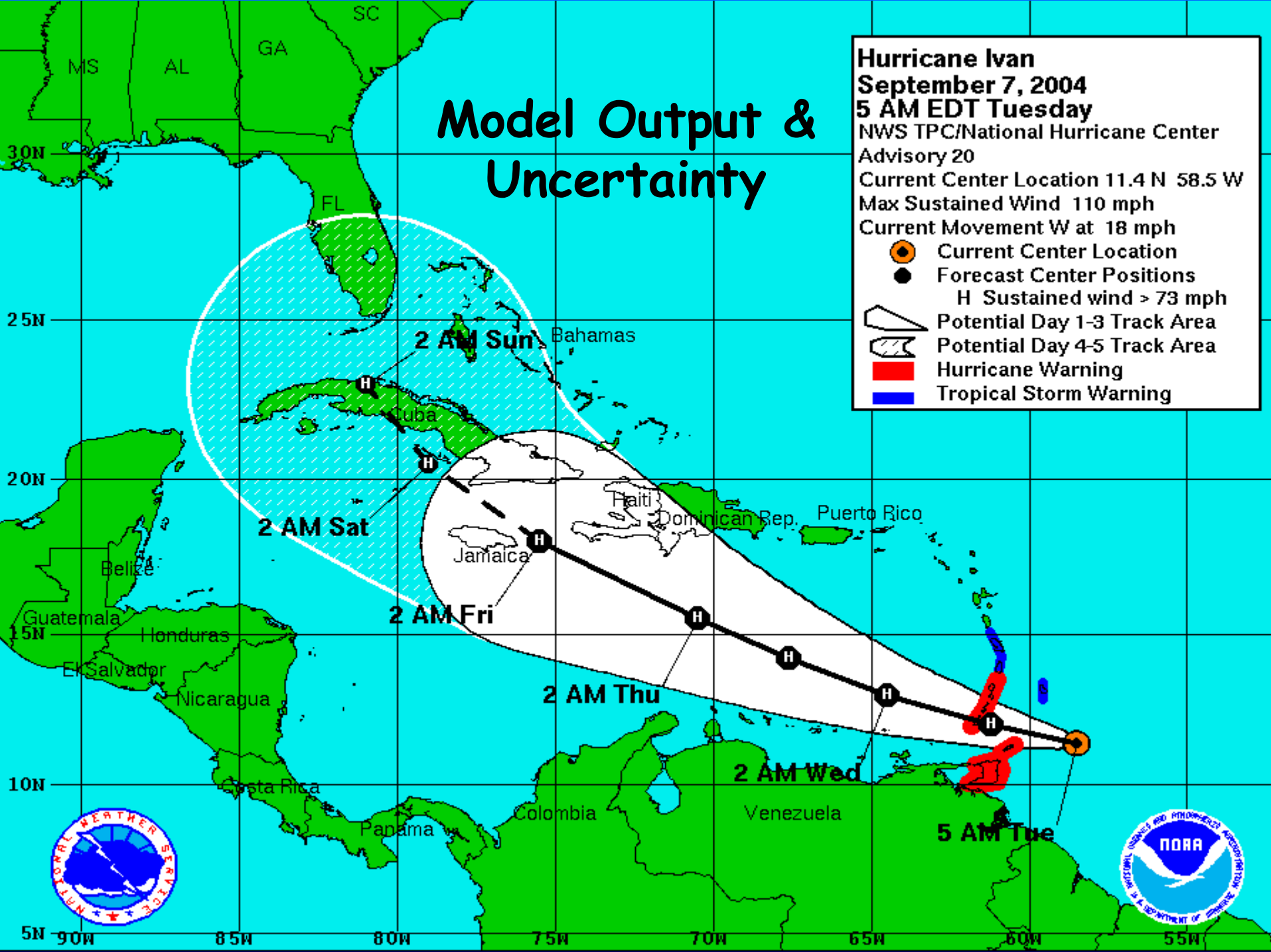
Increasing use of Independent Experts, especially for controversial issues (expensive and time consuming) NOAA-Fisheries funds Center for Independent Experts (U-Miami)

Incorporating Uncertainty in Science & Management

Approaches for articulating uncertainty:

- Describe uncertainty in assessment results and forecasts & show how used in FMP
- describe assumptions and differing results from various approaches
- Articulate where additional research is needed to reduce uncertainty
- Incorporate adaptive approaches to management

Uncertainty in models & data when important decisions need to be made occurs in other fields


Model Output & Uncertainty
Hurricane Ivan
September 7, 2004
5 AM EDT Tuesday
NWS TPC/National Hurricane Center
Advisory 20
Current Center Location 11.4 N 58.5 W
Max Sustained Wind 110 mph
Current Movement W at 18 mph
Current Center Location
Forecast Center Positions
H Sustained wind > 73 mph
Potential Day 1-3 Track Area
Potential Day 4-5 Track Area
Hurricane Warning
Tropical Storm Warning
2 AM Sun
2 AM Sat
2 AM Fri
2 AM Thu
2 AM Wed
5 AM Tue
Bahamas
Cuba
Haiti
Dominican Rep.
Puerto Rico
Jamaica
Belize
Guatemala
Honduras
El Salvador
Nicaragua
Costa Rica
Panama
Colombia
Venezuela
MS
AL
GA
SC
FL
30N
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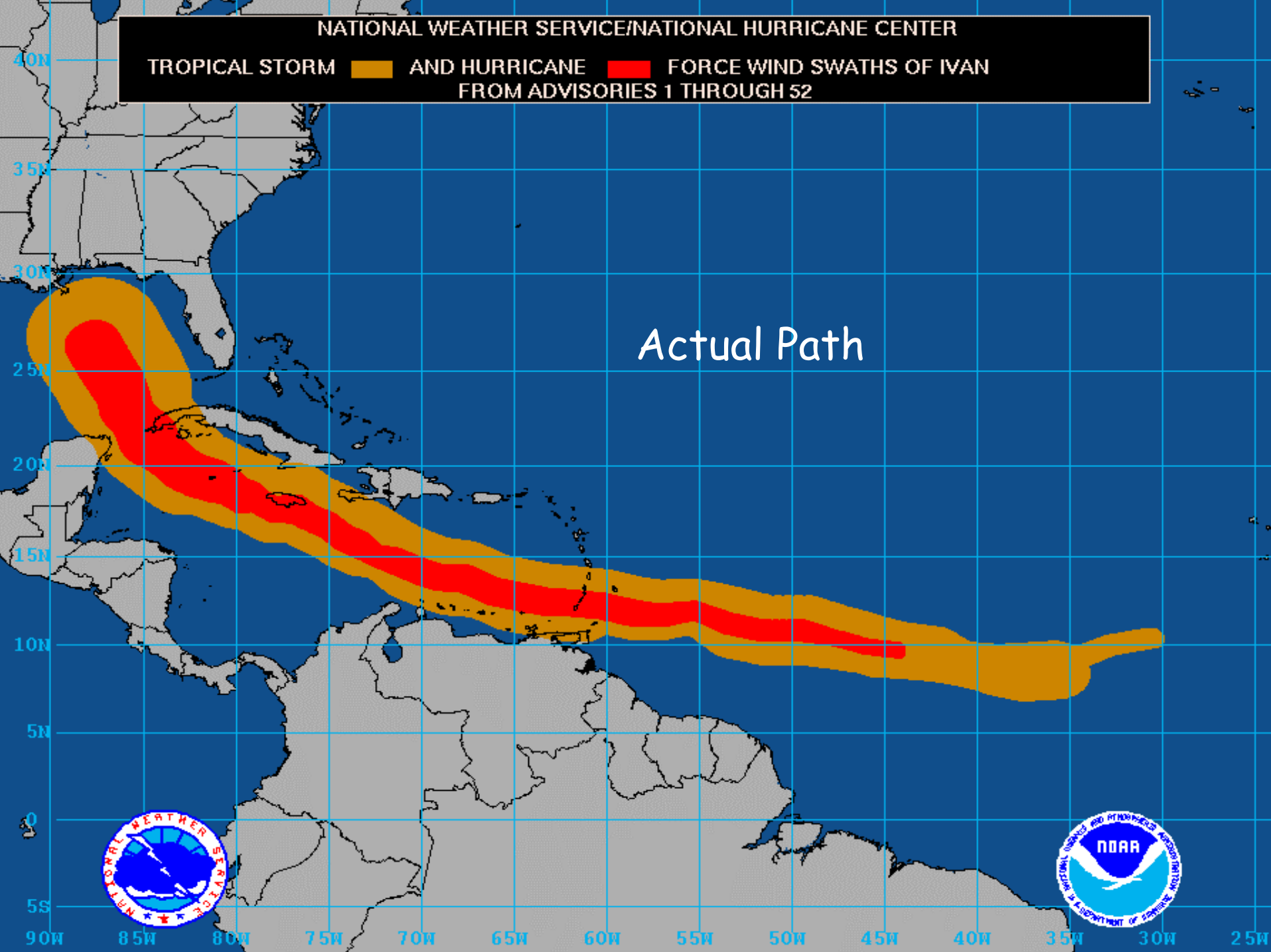
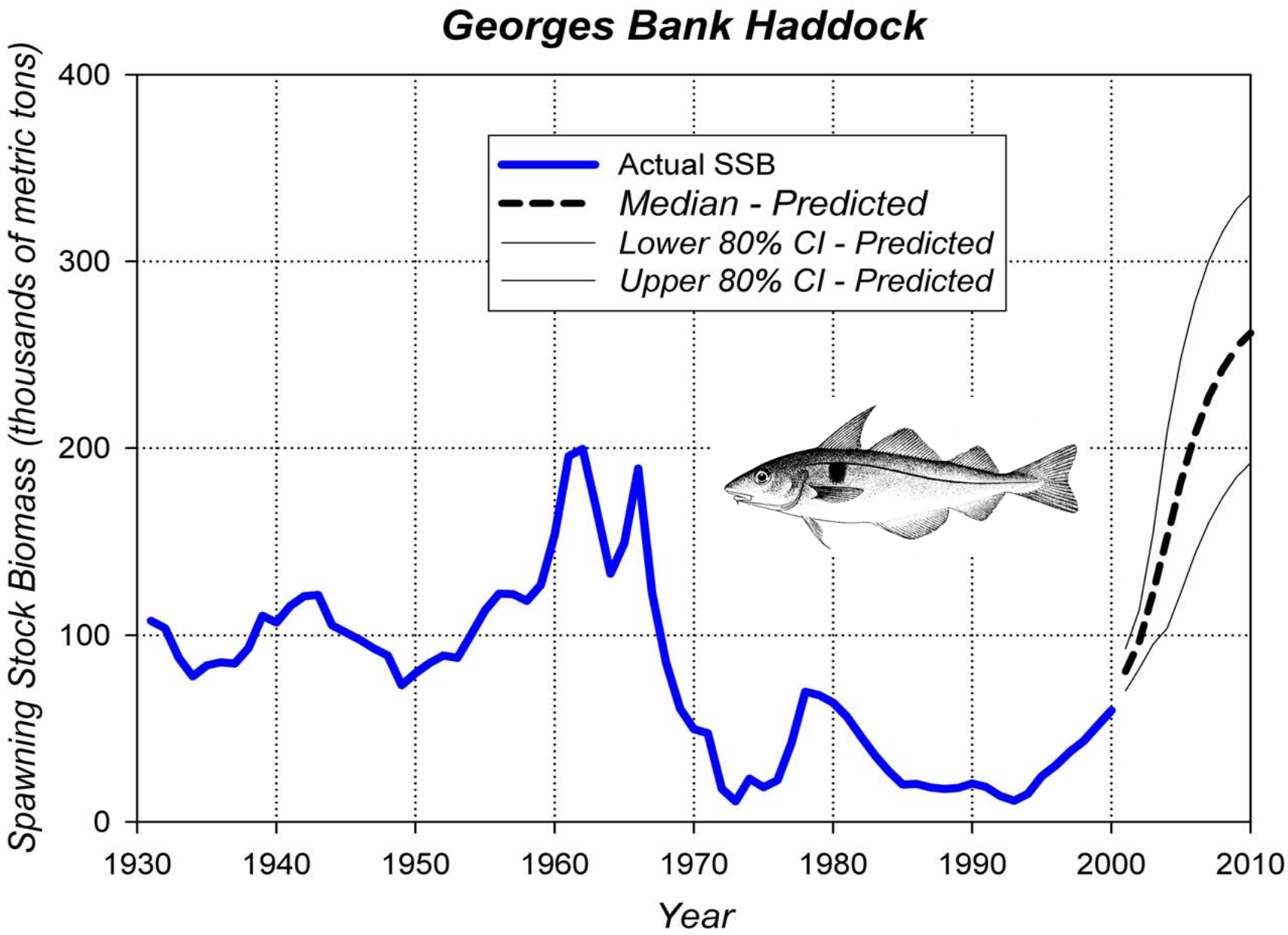
80W
75W
70W
65W
60W
55W


NATIONAL WEATHER SERVICE/NATIONAL HURRICANE CENTER
TROPICAL STORM AND HURRICANE FORCE WIND SWATHS OF IVAN
FROM ADVISORIES 1 THROUGH 52
Actual Path
40N
35N
30N
25N
20N
15N
10N
5N
0
5S
90W
85W
80W
75W
70W
65W
60W
55W
50W
45W
40W
35W
30W
25W
NOAA


Georges Bank Haddock
Spawning Stock Biomass (thousands of metric tons)
400
300
200
100
0
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year
Actual SSB
Median - Predicted
Lower 80% CI - Predicted
Upper 80% CI - Predicted

Improving Best Available Science

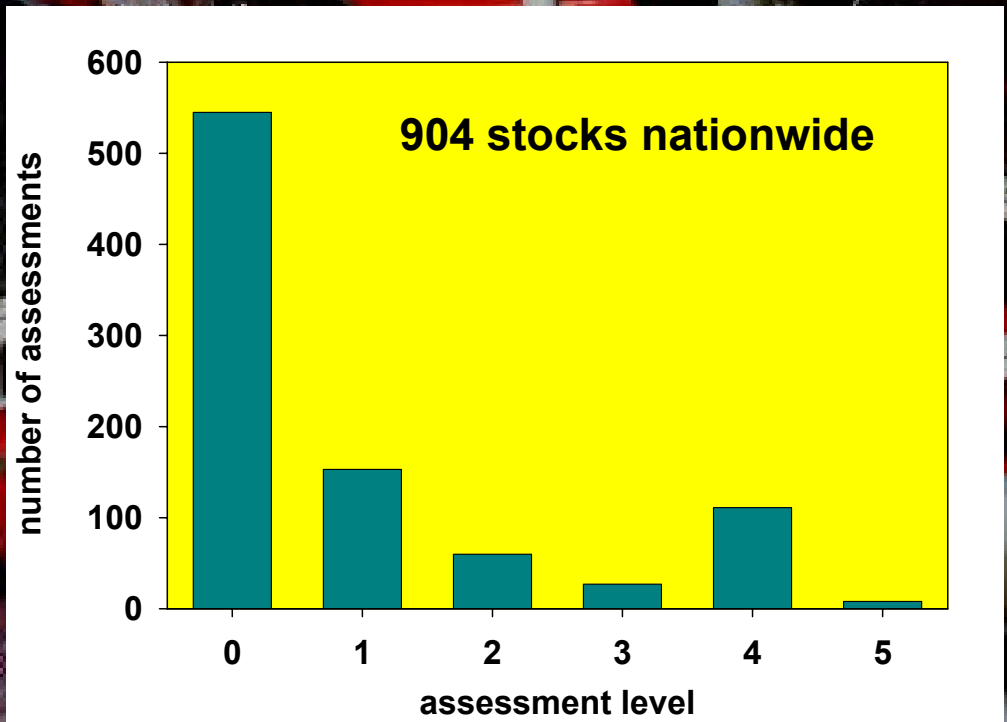
3 Relevant Aspects:
accuracy, precision, and credibility

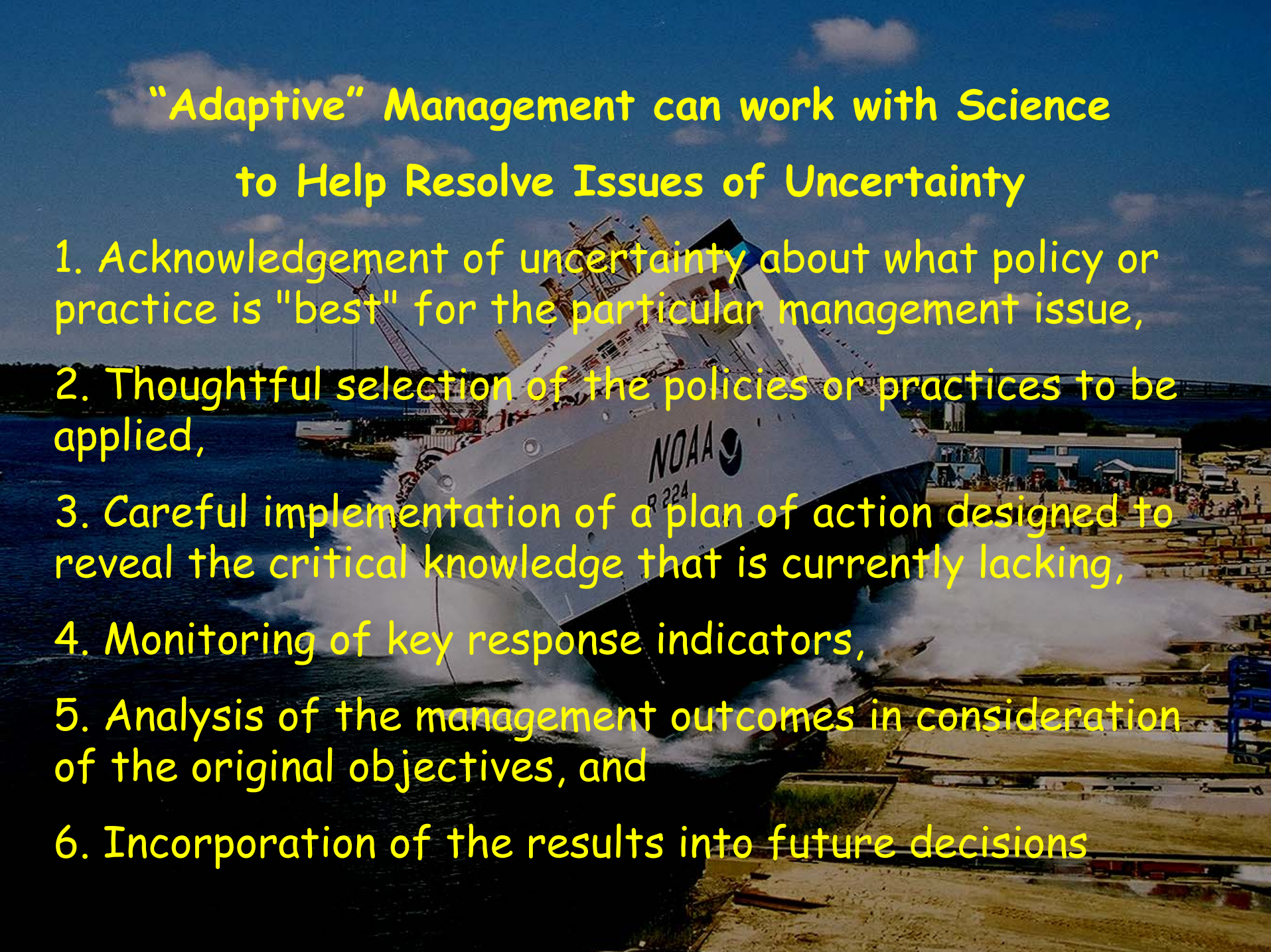
- Stock Assessment Improvement Plan (SAIP)
- Data Acquisition Plan
- Social Sciences/Economic Research Initiative
- Ecosystem Observing Program (EOP), FY 2007-2011
- Partners Initiatives (e.g., ACCSP)
- Cooperative Research Programs (J. Boreman)

Stock Assessment Classification (SAIP)

0 = no assessment possible
1 = index only (commercial or research CPUE)
2 = simple life history equilibrium models
3 = aggregated production models
4 = size/age/stage-structured models
5 = add ecosystem (multispecies, environment), spatial & seasonal analyses

Very few Data-Poor Assessments for valuable Fishery targets (Most "0" stocks are of minor economic importance, mostly SE, AK)





"Adaptive" Management can work with Science to Help Resolve Issues of Uncertainty

1. Acknowledgement of uncertainty about what policy or practice is "best" for the particular management issue,

2. Thoughtful selection of the policies or practices to be applied,

3. Careful implementation of a plan of action designed to reveal the critical knowledge that is currently lacking,

4. Monitoring of key response indicators,

5. Analysis of the management outcomes in consideration of the original objectives, and

6. Incorporation of the results into future decisions

BSIA – Final Thoughts

- *NRC Study identifies need for better communication – by scientists with managers, and by managers with stakeholders & the public concerning what information justifies their actions*
- *Science Centers and FMCs have a common interpretation of NS-2, but there are regional differences in application*
- *BSIA is better administered in guidelines for M-SA rather than in the law (similar to NS-1)*
- *BSIA is a set of quality factors, not a threshold*
- *Ecosystem approaches will require more and different types of information, and additional considerations of uncertainty and risk*